Homework 3 Lists and linked lists

1. A list of client records is stored in a dynamic **list** data structure **clients**.

   The list contains the following elements:

   clients = [‘Gries’, ‘Schneider’, ‘Bergin’, ‘Kozen’, ‘Pearce’]

   Show the state of the list after the execution of the following operations. [2]

   pop(), remove(‘Bergin’), append(‘Kizza’), pop(1), append(‘Brooks’), insert(2,’Merritt’)

3. Here is a list of available operations on a list

List operation	Description
isEmpty()	Test for empty list
append(item)	Add a new item to list
search(item)	Search for an item in list
length()	Return the number of items
index(item)	Return the position of item
insert(pos,item)	Add a new item
pop()	Remove and return the last item in the list
pop(pos)	Remove and return the item at position pos

   (a) Using only the operations from this list, describe how to delete an item. [3]

   (b) Using only the operations from this list, describe how you could add an item to the end of the list without using *append(item)* . [2]

   (c) Using only the operations from this list, describe how to implement the queue methods *enQueue(item)* and *item = deQueue().* Do not worry about full or empty. [2]

3. Fruit is going to be stored as a list.

   Here is a list of fruit records: (Banana, Strawberry, Melon, Lemon)

   (a) Draw a diagrammatic representation of this list in alphabetical order, when implemented as a classic linked list.

   (b) Draw a diagram to show how Blueberry would be added to the list.

   (c) Explain how you would insert a new item into the linked list, maintaining the correct alphabetic sequence. Assume `nextfree` points to the next free space in the list. [4]

   (d) Write a pseudocode algorithm to print out all the items in the list, and the total number of items. [5]

[Total 20 Marks]